

## Emulex 10GbE Virtual Fabric Adapter II for BladeCenter Product Guide (withdrawn product)

The Emulex 10 GbE Virtual Fabric Adapter II and Emulex 10 GbE Virtual Fabric Adapter Advanced II are enhancements to the existing BladeCenter® Virtual Fabric portfolio. These adapters allow clients to simplify their I/O infrastructure by reducing the number of switches needed inside the chassis. The Emulex 10GbE Virtual Fabric Adapter II is a dual-port 10 Gb Ethernet card that supports 1 Gbps or 10 Gbps traffic, or up to eight virtual NIC (vNIC) devices.

The virtual NICs are configured to meet the client's mix of network connectivity and throughput demands for today's complex server application environments. Each physical 10 Gbps port can be divided into four virtual ports with bandwidth allocation in 100 Mbps increments to the maximum 10 Gbps per physical port. The Emulex 10GbE Virtual Fabric Adapter II Advanced adds FCoE and iSCSI hardware initiator functionality.

The Emulex 10 GbE Virtual Fabric Adapter II is shown in the following figure.



Figure 1. Emulex 10GbE Virtual Fabric Adapter II for BladeCenter

### Did you know?

This adapter is based on industry-standard PCIe architecture and offers the flexibility to operate as a Virtual NIC Fabric Adapter or as a dual-port 10Gb or 1Gb Ethernet device. Because this adapter supports up to eight virtual NICs on a single dual-port Ethernet adapter, you see benefits in cost, power/cooling, and data center footprint by deploying less hardware. The adapter enables you to configure up to 12 NIC devices on a single blade server: eight virtual NICs with the Emulex 10 GbE Virtual Fabric Adapter II plus the two onboard NICs plus two from a CIOv expansion card.

## Part number information

Table 1. Ordering part number and feature code

Description	Part number	Feature code
Emulex 10GbE Virtual Fabric Adapter II - BladeCenter	90Y3550*	A1XG
Emulex 10GbE Virtual Fabric Adapter II Advanced - BladeCenter	90Y3566*	AIXH
Emulex 10GbE Virtual Fabric Adapter II - BladeCenter	00Y3266	A3NV
Emulex 10GbE Virtual Fabric Adapter Advanced II - BladeCenter	00Y3264*	A3NW
Emulex 10GbE Virtual Fabric Advanced Upgrade for BladeCenter	49Y4265*	2436

\* Withdrawn from marketing

The adapter part number includes the following items:

- One Emulex 10GbE Virtual Fabric Adapter II or Emulex 10GbE Virtual Fabric Adapter II Advanced
- Documentation CD
- Important Notices flyer

The standard Emulex 10GbE Virtual Fabric Adapter II can be upgraded to the same features as the Emulex 10GbE Virtual Fabric Adapter II Advanced with the addition of the Emulex 10GbE Virtual Fabric Advanced Upgrade option, part number 49Y4265.

## Features

Emulex Virtual Fabric Adapter II and Emulex Virtual Fabric Adapter Advanced II have these features:

- Connection to either 1 Gb or 10 Gb data center infrastructure (1 Gb and 10 Gb auto-negotiation)
- PCI Express 2.0 x8 host interface
- CFFh form factor, can be combined with a CIOv expansion card on the same blade server
- 10 Gb ports operating in a virtual NIC (vNIC), Unified Fabric Port (UFP), or physical NIC (pNIC) mode
  - vNIC mode: Up to eight vNICs (up to four vNICs per one 10 Gb port)
    - Virtual Fabric or Switch Independent mode of operation
    - Virtual port bandwidth allocation in 100 Mbps increments
    - Up to two vNICs can be configured as an iSCSI or FCoE vNICs (one per port) with optional Advanced Upgrade (49Y4265) or with Emulex 10GbE VFA Advanced II (00Y3264)
  - UFP mode: Up to eight virtual ports (vPorts) (up to four vPorts per one 10 Gb port)
    - **Note:** UFP is supported using Emulex 1212 code on VFA II with HS22 blade servers.
    - Virtual port bandwidth allocation in 100 Mbps increments
    - Up to two vPorts can be configured as an iSCSI or FCoE vPorts (one per port) with optional Advanced Upgrade (49Y4265) or with Emulex 10GbE VFA Advanced II (00Y3264)
  - pNIC mode: dual-port 1/10 Gb Ethernet adapter
    - With optional Advanced Upgrade (49Y4265) or with Emulex 10GbE VFA Advanced II (00Y3264), the pNIC mode enables two LAN (10 GbE) ports and two storage ports (iSCSI or FCoE).
- Wake On LAN support
- Full-duplex (FDX) capability
- Bus-mastering support
- Direct memory access (DMA) support
- Preboot Execution Environment (PXE) support
- IPv4/IPv6 TCP, UDP checksum offload
  - Large send offload (LSO)
  - Large receive offload
  - Receive side scaling (RSS)
  - IPv4 TCP Chimney Offload
  - TCP Segmentation Offload
- VLAN insertion and extraction
- Jumbo frames up to 9000 bytes
- Load balancing and failover support including adapter fault tolerance (AFT), switch fault tolerance (SFT), adaptive load balancing (ALB), teaming support, and IEEE 802.3ad

- Enhanced Ethernet (draft)
  - Enhanced Transmission Selection (ETS) (P802.1Qaz)
  - Priority-based Flow Control (PFC) (P802.1Qbb)
  - Data Center Bridging Capabilities eXchange Protocol, CIN-DCBX and CEE-DCBX (P802.1Qaz)
- The Emulex Virtual Fabric Adapter Advanced II provides FCoE and iSCSI hardware initiator support.
- Supports Serial over LAN (SoL) and concurrent KVM (cKVM)

## Modes of operation

The original Emulex 10GbE Virtual Fabric Adapter can be configured in pNIC or vNIC mode. The new Emulex 10GbE Virtual Fabric Adapter II offers the following modes of operation:

- Virtual Fabric Mode (also known as vNIC1 mode) only works in conjunction with Virtual Fabric 10Gb Switch Module installed in I/O module bays 7 and 9 in the chassis. In this mode, the Emulex adapter communicated with the switch module to obtain vNIC parameters (using DCBX). Also, a special tag within each data packet is added and later removed by the NIC and switch for each vNIC group to maintain separation of the virtual channels. In vNIC mode, each physical port is divided into four virtual ports providing a total of eight virtual NICs per adapter. The default bandwidth for each vNIC is 2.5 Gbps. Bandwidth for each vNIC can be configured at the Virtual Fabric switch from 100 Mbps to 10 Gbps, up to a total of 10 Gb per physical port. The vNICs can also be configured to have 0 bandwidth if you must allocate the available bandwidth to fewer than eight vNICs. In Virtual Fabric Mode, you can change the bandwidth allocations through the Virtual Fabric switch user interfaces without requiring a reboot of the server.

When storage protocols are enabled on the Emulex 10GbE Virtual Fabric Adapter Advanced II, six ports are Ethernet, and two ports are either iSCSI or FCoE

- Switch Independent Mode, where the adapter works with the following switches:
  - Virtual Fabric 10Gb Switch Module
  - Cisco Nexus 4001I Switch Module
  - Brocade Converged 10GbE Switch Module
  - 10Gb Ethernet Pass-Thru Module and a top-of-rack (TOR) switch

These switches must be installed in I/O module bays 7 and 9 in the chassis. Beyond the way that the adapter communicates with the switch, Switch Independent Mode offers the same capabilities as Virtual Fabric Mode in terms of the number of vNICs and the bandwidth each can be configured to have. Switch Independent Mode extends the existing customer VLANs to the virtual NIC interfaces. The IEEE 802.1Q VLAN tag is essential to the separation of the vNIC groups by the NIC adapter or driver and the switch. The VLAN tags are added to the packet by the applications or drivers at each end station rather than by the switch.

- Unified Fabric Port only works in conjunction with Virtual Fabric 10Gb Switch Module installed in I/O module bays 8 and 10 in the chassis. With UFP, the Emulex adapter communicates with the switch module to obtain vPort parameters. UFP has a number of modes associated with it, including:
  - Tunnel mode: Provides Q-in-Q mode, where the vPort is customer VLAN-independent (very similar to vNIC Virtual Fabric Dedicated Uplink Mode)
  - Trunk mode: Provides a traditional 802.1Q trunk mode (multi-VLAN trunk link) to the virtual NIC (vPort) interface, i.e. permits host side tagging
  - Access mode: Provides a traditional access mode (single untagged VLAN) to the virtual NIC (vPort) interface which is similar to a physical port in access mode
  - FCoE mode: Provides FCoE functionality to the vPort
  - Auto-VLAN mode: Auto VLAN creation for Qbg and VMready environments

With UFP, each physical port is divided into four virtual ports, providing a total of eight vPorts per adapter. Bandwidth for each vPort can be configured at the Virtual Fabric 10Gb Switch Module from 100 Mbps to 10 Gbps, up to a total of 10 Gb per physical port. The vPorts can also be configured to have 0 bandwidth if you must allocate the available bandwidth to fewer than eight vPorts. In UFP mode, you can change the bandwidth allocations through the Virtual Fabric 10Gb Switch Module user interfaces without requiring a reboot of the server.

When storage protocols are enabled on the Emulex 10GbE Virtual Fabric Adapter Advanced II for HS23, six ports are Ethernet, and two ports (vPort 2 on each physical port) are either iSCSI or FCoE.

- In pNIC mode, the expansion card can operate as a standard 10 Gbps or 1 Gbps 2-port Ethernet expansion card. When in pNIC mode, the expansion card functions with any available 10 Gb switch or 10 Gb pass-thru module installed in I/O module bays 7 and 9. In pNIC mode, the Advanced adapter or the Advanced upgrade operates in traditional Converged Network Adapter (CNA) mode with two Ethernet ports and two storage ports (iSCSI or FCoE) available to the operating system..

## Supported servers

The Emulex 10GbE Virtual Fabric Adapter II and Emulex 10GbE Virtual Fabric Adapter II Advanced are supported in the BladeCenter servers listed in Table 2.

Table 2. Supported BladeCenter servers

Part number	Product description	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7873)
90Y3550	Emulex 10GbE Virtual Fabric Adapter II	N	Y	Y	N	N	Y	Y
90Y3566	Emulex 10GbE Virtual Fabric Adapter Advanced II	N	Y	Y	N	N	Y	Y
00Y3266	Emulex 10GbE Virtual Fabric Adapter II	N	Y	Y	N	N	Y	Y
00Y3264	Emulex 10GbE Virtual Fabric Adapter Advanced II	N	Y	Y	N	N	Y	Y
49Y4265	Emulex 10GbE Virtual Fabric Advanced Upgrade	N	Y	Y	N	N	Y	Y

Figure 2 shows where the CFFh card is installed in a BladeCenter server.

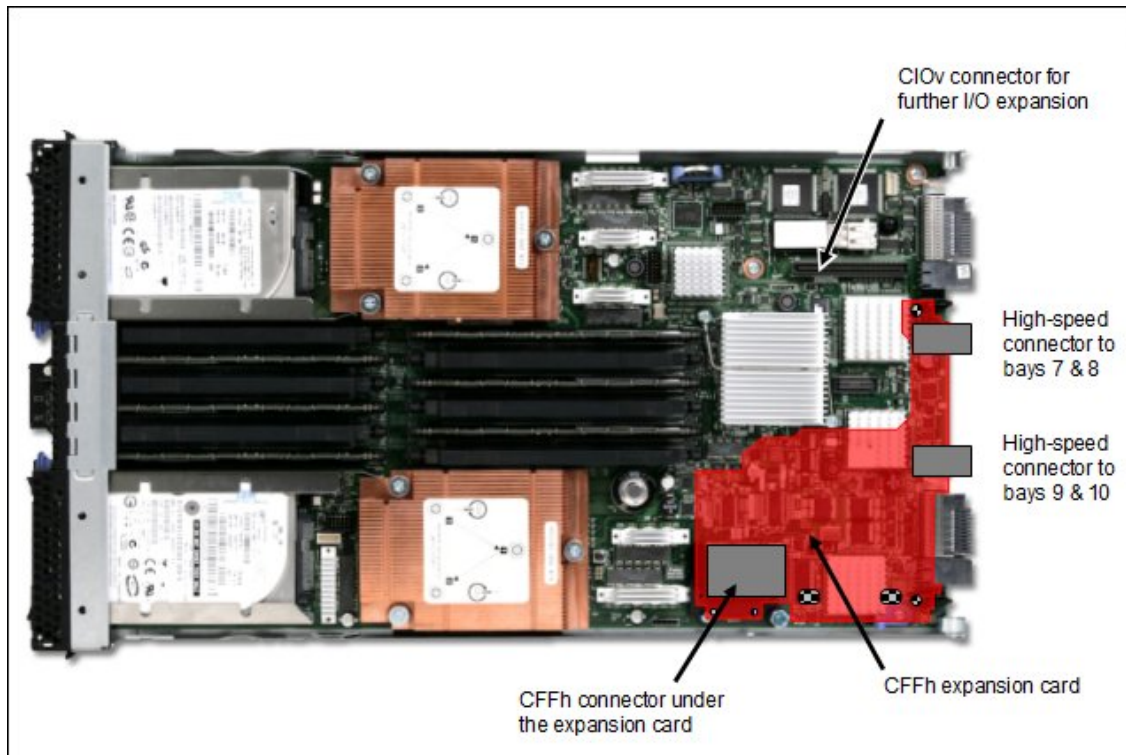


Figure 2. Location on the BladeCenter server planar where the CFFh card is installed

## Supported BladeCenter chassis and I/O modules

BladeCenter chassis support is based on the blade server type in which the expansion card is installed. Consult the ServerProven® website to see in which chassis each blade server type is supported:

<http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/>

Table 3 lists the supported chassis and I/O module combinations that the Emulex 10GbE Virtual Fabric Adapter II supports, in either standard physical port mode (pNIC) or one of the NIC virtualization modes: Virtual Fabric, Switch Independent, or Unified Fabric Port.

Table 3. I/O modules supported with the Emulex 10GbE Virtual Fabric Adapter II

Part number	Description	BladeCenter S	BladeCenter E	BladeCenter H	BladeCenter T	BladeCenter HT	MSIM	MSIM-HT
<b>Virtual Fabric vNIC mode</b>								
46C7191	Virtual Fabric 10Gb Switch Module	N	N	Y	N	Y	N	N
39Y9267	6-port 10 Gb High Speed Switch Module	N	N	N	N	N	N	N
46M6181	10Gb Ethernet Pass-Thru Module	N	N	N	N	N	N	N
46M6071	Cisco Nexus 4001I Switch Module	N	N	N	N	N	N	N
69Y1909	Brocade Converged 10GbE Switch Module	N	N	N	N	N	N	N
<b>Switch Independent vNIC mode</b>								
46C7191	Virtual Fabric 10Gb Switch Module	N	N	Y	N	Y	N	N
39Y9267	6-port 10 Gb High Speed Switch Module	N	N	N	N	N	N	N
46M6181	10Gb Ethernet Pass-Thru Module	N	N	Y	N	Y	N	N
46M6071	Cisco Nexus 4001I Switch Module	N	N	Y	N	Y	N	N
69Y1909	Brocade Converged 10GbE Switch Module	N	N	Y	N	Y	N	N
<b>Unified Fabric Port</b>								
46C7191	Virtual Fabric 10Gb Switch Module	N	N	Y	N	Y	N	N
39Y9267	6-port 10 Gb High Speed Switch Module	N	N	N	N	N	N	N
46M6181	10Gb Ethernet Pass-Thru Module	N	N	N	N	N	N	N
46M6071	Cisco Nexus 4001I Switch Module	N	N	N	N	N	N	N
69Y1909	Brocade Converged 10GbE Switch Module	N	N	N	N	N	N	N
<b>pNIC mode</b>								
46C7191	Virtual Fabric 10Gb Switch Module	N	N	Y	N	Y	N	N
39Y9267	6-port 10 Gb High Speed Switch Module	N	N	N	N	N	N	N
46M6181	10Gb Ethernet Pass-Thru Module	N	N	Y	N	Y	N	N
46M6071	Cisco Nexus 4001I Switch Module	N	N	Y	N	Y	N	N
69Y1909	Brocade Converged 10GbE Switch Module	N	N	Y	N	Y	N	N

In BladeCenter H, the ports of CFFh cards are routed through the midplane to I/O bays 7, 8, 9, and 10, as shown in Figure 3. The BladeCenter HT is similar in that the CFFh cards are also routed through the midplane to I/O bays 7, 8, 9, and 10.

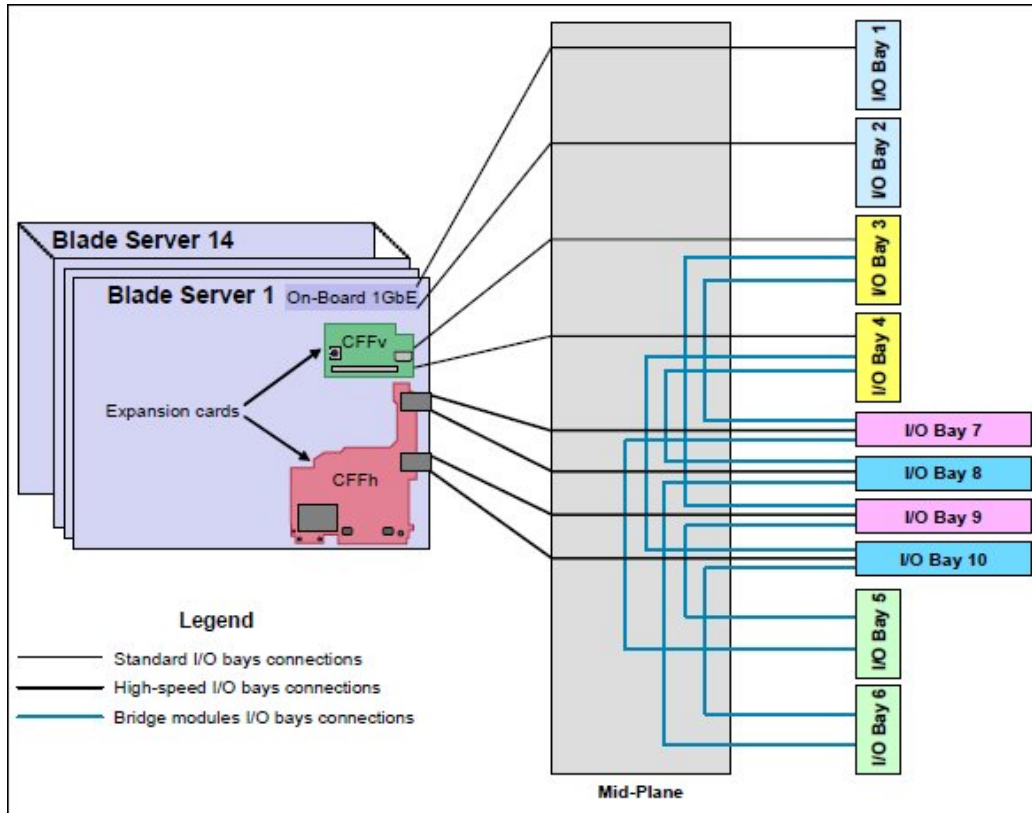


Figure 3. BladeCenter H I/O topology showing the I/O paths from CFFh expansion cards

The Emulex 10GbE Virtual Fabric Adapter II and Emulex 10GbE Virtual Fabric Adapter II Advanced require that two I/O modules be installed in bays 7 and 9 of the BladeCenter H and HT chassis (Table 4).

Table 4. Locations of I/O modules required to connect to the expansion card

Expansion card	I/O bay 7	I/O bay 8	I/O bay 9	I/O bay 10
Emulex 10GbE Virtual Fabric Adapter II	Supported I/O module	Not used	Supported I/O module	Not used
Emulex 10GbE Virtual Fabric Adapter II Advanced	Supported I/O module	Not used	Supported I/O module	Not used

MAC addresses are assigned to the expansion card. In Virtual Fabric Adapter mode (vNIC mode), each of the eight virtual ports is assigned a MAC address. In 2-port 10 Gb Ethernet mode (pNIC mode), each of the two physical ports is assigned a MAC addresses.

## Typical configurations

This section shows a configuration that uses the Emulex 10GbE Virtual Fabric Adapter II.

Figure 4 shows the use of the Emulex 10GbE Virtual Fabric Adapter II to route either two physical ports or eight virtual ports to the Virtual Fabric 10Gb Switch Modules installed in the BladeCenter chassis. Two Virtual Fabric 10Gb Switch Modules are installed in bay 7 and bay 9 of the BladeCenter H chassis. All connections between the controller, card, and the switch modules are internal to the chassis. No cabling is needed.

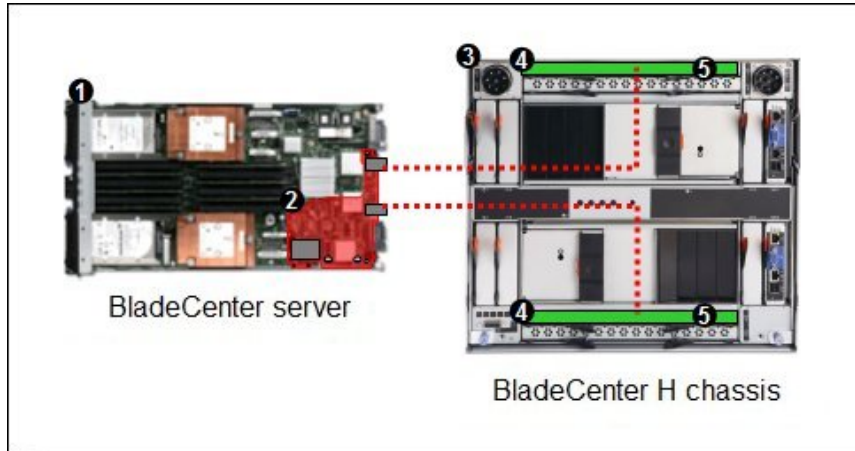


Figure 4. Configuration using the Emulex 10GbE Virtual Fabric Adapter II

Depending on how you configure the switch and expansion card, you can get either of these combinations:

- Eight virtual Ethernet ports (either vNIC mode). Each virtual port can be configured to operate at 100 Mbps to 10 Gbps, up to a total maximum of 10 Gb per physical port. The default bandwidth is 2.5 Gb per virtual port.
- Two 1 Gb or 10 Gb Ethernet ports (pNIC mode).

The components used in this configuration are listed in Table 5.

Table 5. Components used when connecting the Emulex adapter to two Virtual Fabric switch modules

Diagram reference	Part number/ machine type	Description	Quantity
1	7870	BladeCenter HS22	1 to 14
2	00Y3266	Emulex 10GbE Virtual Fabric Adapter II	1 per server
3	8852 or 8740/8750	BladeCenter H or BladeCenter HT	1
4	46C7191	Virtual Fabric 10Gb Switch Module	2
5	46C3447	SFP+ SR Transceiver	Up to 20*

\* To communicate outside the chassis, you must have either one SFP+ transceiver or SFP+ direct-attached cable (DAC) for each of the external 10 Gb ports on the Virtual Fabric 10Gb Switch Module that you wish to enable.

## Storage connectivity

Supported FCoE configurations are shown in the following table.

Table 6. Supported FCoE configurations

Virtual Fabric adapter	FCoE upgrade	BladeCenter I/O module	FCF switch	SAN fabric	OS support	Storage targets		
<ul style="list-style-type: none"> <li>Emulex 10GbE VFA II - BladeCenter, 00Y3266</li> <li>Emulex 10GbE VFA Advanced II - BladeCenter, 00Y3264</li> </ul>	<ul style="list-style-type: none"> <li>49Y4265 (not needed for 00Y3264)</li> </ul>	<ul style="list-style-type: none"> <li>Virtual Fabric 10Gb Switch Module, 46C7191 (vNIC1, vNIC2, UFP, pNIC)</li> </ul>	<ul style="list-style-type: none"> <li>QLogic Virtual Fabric Extension Module, 46M6172 (Full Fabric mode)</li> </ul>	<ul style="list-style-type: none"> <li>Brocade <ul style="list-style-type: none"> <li>Cisco MDS</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>RHEL 5, 6</li> <li>SLES 10, 11</li> <li>vSphere 4.1, 5.0, 5.1</li> <li>Windows Server 2008 R2, 2012, 2012 R2</li> </ul>	<ul style="list-style-type: none"> <li>DCS3700</li> <li>DS3500</li> <li>DS5000</li> <li>DS8000</li> <li>SVC</li> <li>V3500</li> <li>V3700</li> <li>V5000</li> <li>V7000</li> <li>XIV</li> <li>Tape</li> </ul>		
			<ul style="list-style-type: none"> <li>QLogic Virtual Fabric Extension Module, 46M6172 (NPV mode)</li> </ul>				<ul style="list-style-type: none"> <li>Brocade VDX 6730</li> </ul>	
			<ul style="list-style-type: none"> <li>Brocade VDX 6730</li> </ul>					
		<ul style="list-style-type: none"> <li>10Gb Ethernet Pass-thru Module, 46M6181 (vNIC2, pNIC)</li> </ul>	<ul style="list-style-type: none"> <li>Cisco Nexus 5010</li> <li>Cisco Nexus 5020</li> <li>Cisco Nexus 5548</li> <li>Cisco Nexus 5596</li> </ul>	<ul style="list-style-type: none"> <li>Brocade VDX 6730</li> </ul>			<ul style="list-style-type: none"> <li>Brocade</li> </ul>	
			<ul style="list-style-type: none"> <li>Brocade VDX 6730</li> </ul>					<ul style="list-style-type: none"> <li>Brocade</li> <li>Cisco MDS</li> </ul>
			<ul style="list-style-type: none"> <li>G8264CS (NPV mode)</li> <li>G8264CS (Full Fabric mode)</li> </ul>					
		<ul style="list-style-type: none"> <li>Cisco Nexus 4001I Switch Module, 46M6071 (vNIC2, pNIC)</li> </ul>	<ul style="list-style-type: none"> <li>Cisco Nexus 5010</li> <li>Cisco Nexus 5020</li> <li>Cisco Nexus 5548</li> <li>Cisco Nexus 5596</li> </ul>	<ul style="list-style-type: none"> <li>Brocade VDX 6730</li> </ul>			<ul style="list-style-type: none"> <li>Brocade</li> <li>Cisco MDS</li> </ul>	

Supported iSCSI configurations are shown in the following table.

**Note:** System Storage Interoperation Center normally only lists support for iSCSI storage attached using hardware iSCSI offload adapters in the servers. BladeCenter servers support any type of iSCSI (1Gb or 10Gb) storage as long as software iSCSI initiator device drivers meet the storage requirements for the operating system and device driver levels.

Table 7. Supported iSCSI configurations



Virtual Fabric adapter	iSCSI upgrade	BladeCenter I/O module	External Ethernet switch	OS support	Storage targets
<ul style="list-style-type: none"> <li>Emulex 10GbE VFA II - BladeCenter, 00Y3266</li> <li>Emulex 10GbE VFA Advanced II - BladeCenter, 00Y3264</li> </ul>	<ul style="list-style-type: none"> <li>49Y4265 (not needed for 00Y3264)</li> </ul>	<ul style="list-style-type: none"> <li>Virtual Fabric 10Gb Switch Module, 46C7191 (vNIC1, vNIC2, UFP, pNIC)</li> </ul>	<ul style="list-style-type: none"> <li>Any Ethernet switch</li> <li>RackSwitch G8124E</li> </ul>	<ul style="list-style-type: none"> <li>RHEL 5, 6</li> <li>SLES 10, 11</li> <li>vSphere 4.0, 5.0, 5.1</li> <li>Windows Server 2008 R2, 2012, 2012 R2</li> </ul>	<ul style="list-style-type: none"> <li>DCS3700</li> <li>DS3500</li> <li>DS5000</li> <li>SVC</li> <li>V3500</li> <li>V3700</li> <li>V5000</li> <li>V7000</li> <li>XIV</li> </ul>

**Important:** Use these tables only as a starting point. Configuration support must be verified through the IBM System Storage Interoperation Center (SSIC) found at the following website:  
<http://www.ibm.com/systems/support/storage/ssic>

## Operating environment

This adapter complies with temperature rating requirements for BladeCenter H and BladeCenter HT chassis and is supported in the following environment:

- Temperature - Operating:
  - 10 to 52° C (50 to 125° F) at an altitude of 0 to 914 m (0 to 3,000 ft)
  - 10 to 49° C (50 to 120° F) at an altitude of 0 to 3,000 m (0 to 10,000 ft)
- Temperature - Non-operating:
  - 40 to 65°C (-40 to 149° F) at an altitude of 0 to 12,000 m (0 to 39,370 ft)
- Humidity
  - Operating: 8 to 80%, noncondensing
  - Non-operating: 5 to 80%, noncondensing

## Operating system support

The Emulex 10GbE Virtual Fabric Adapter II supports the following operating systems:

- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2012
- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2008, Web x86 Edition
- Microsoft Windows Server 2008, Web x64 Edition
- Microsoft Windows Server 2008, Standard x86 Edition
- Microsoft Windows Server 2008, Standard x64 Edition
- Microsoft Windows Server 2008, Enterprise x86 Edition
- Microsoft Windows Server 2008, Enterprise x64 Edition
- Microsoft Windows Server 2008, Datacenter x86 Edition
- Microsoft Windows Server 2008, Datacenter x64 Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- Red Hat Enterprise Linux 6 Server Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- Red Hat Enterprise Linux 5 Server Edition
- SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T
- SUSE Linux Enterprise Server 11 for x86
- SUSE Linux Enterprise Server 11 for AMD64/EM64T
- SUSE Linux Enterprise Server 10 with Xen for AMD64/EM64T
- SUSE Linux Enterprise Server 10 for x86
- SUSE Linux Enterprise Server 10 for AMD64/EM64T
- VMware vSphere 5.5 (ESXi)
- VMware vSphere 5.1 (ESXi)
- VMware vSphere 5.0 (ESXi)
- VMware ESXi 4.1
- VMware ESXi 4.0
- VMware ESX 4.1
- VMware ESX 4.0

Support for operating systems is based on the combination of the expansion card and the blade server on which it is installed. See the ServerProven web site for the latest information about the specific versions and service packs supported. Select the blade server, and then select the expansion card to see the supported operating systems.

<http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/>

## Related publications and links

For more information refer to the following resources:

- RETAIN® tip H197476: vNIC support - Emulex 10 Gigabit Ethernet Virtual Fabric Adapters  
<http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5085659>
- *BladeCenter Interoperability Guide*  
<http://lenovopress.com/bcig>
- *BladeCenter Products and Technology*, SG24-7523  
<http://lenovopress.com/sg247523>

## Related product families

Product families related to this document are the following:

- [Blade Network Adapters](#)

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